HERPETOLOGY.—*A critical synopsis of the Mexican lizards of the* Uta ornata *complex and a description of a new species from Chihuahua.*[1] M. B. MITTLEMAN, Ohio University, Athens, Ohio. (Communicated by LEONHARD STEJNEGER.)

Since Schmidt (1921) published his brief paper containing diagnoses of new forms and a key to the entire genus, no one paper has appeared dealing with the Utas as a cohesive whole, or in entirety. Neither has any paper dealt with all the forms within any one group of the genus. Smith (1935) published the description of a new species (*Uta caerulea*) from Mexico and included in his paper some notes on certain other Mexican Utas, which up to that time had been largely neglected in the literature. In his lengthy work on the reptiles of western North America, Van Denburgh (1922) treated only those forms coming within the scope of his studies, namely, the species and subspecies occurring in the United States, extreme northern Mexico, Baja California, and the islands within the Gulf of California. The notes and diagnoses herein deal with the Mexican representatives of the *Uta ornata* complex and are offered until a longer paper dealing with the entire complex is published.[2]

Uta ornata lateralis Boulenger Figs. 1A, 2

Uta (*Phymatolepis*) *lateralis* Boulenger, Ann. Mag. Nat. Hist. (ser. 5) 11: 342. 1883.

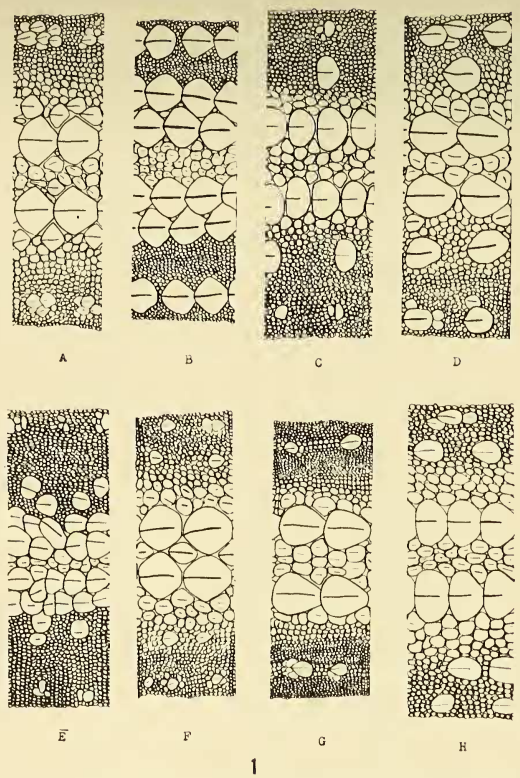
Type locality.—Tres Marias Islands and Presidio de Mazatlán, Sinaloa.

Cotypes.—BMNH 81.10.91–4 and 82.12.5.2.

Diagnosis.—One to three vertebral rows of enlarged, imbricate, carinated, irregularly arranged scales, extending from the nape of the neck onto the base of the tail for a distance equal to slightly more than half the length of the femur; bordered on either side by one, and then two series of enlarged, prominently carinated, imbricate, regularly arranged scales, those of the inner series being approximately twice as large or larger, than those of the outer series; largest of the dorsal scales superior in size to the largest of the enlarged, carinated scales of the femur and tibia; two or three elongated series of thoracic tubercles; a dorsolateral series of enlarged, mucronate, and tubercular scales, extending from the supra-axillary or thoracic region to the

[1] Received November 22, 1940.

[2] For the loan of comparative material, much useful information, and innumerable other courtesies, I express my gratitude and obligation to: Drs. Leonhard Stejneger, Alexander Wetmore, and Doris M. Cochran, of the United States National Museum; Dr. G. K. Noble and Charles M. Bogert, of the American Museum of Natural History; Joseph R. Slevin, of the California Academy of Sciences; Dr. Angus M. Woodbury, of the University of Utah; Dr. Howard K. Gloyd, of the Chicago Academy of Sciences; Dr. Edward H. Taylor, of the University of Kansas; Dr. Hobart M. Smith; H. W. Parker, Esq., of the British Museum; Karl P. Schmidt, of the Field Museum of Natural History; Dr. Thomas Barbour and Benjamin Shreve, of the Museum of Comparative Zoology; and Dr. E. Raymond Hall, of the Museum of Vertebrate Zoology. I am especially indebted to Dr. Herschel T. Gier, of Ohio University, who has been a constant source of advice and inspiration. Contribution No. 19 from the Department of Zoology, Ohio University, Athens, Ohio.



1

2

Fig. 1.—Characteristic enlarged dorsal scales of the several Mexican species of the *Uta ornata* complex: A, *Uta ornata lateralis* Boulenger, topotype, M.C.Z. no. 22467, male, Maria Magdalena Island, Mexico. B, *Uta clarionensis* Townsend, type, U.S.N.M. no. 15904, male, Clarion Island, Revillagigedo Archipelago, Mexico. C, *Uta unica*, sp. nov., type, U.S.N.M. no. 14248, female, Chihuahua, Mexico. D, *Uta bi-carinata tuberculata* Schmidt, M.C.Z. no. 37856, male, Guirocabo, 20 miles southeast of Alamos, Sonora, Mexico. E, *Uta auriculata* Cope, type, U.S.N.M. no. 7027, female, Socorro Island, Revillagigedo Archipelago, Mexico. F, *Uta bi-carinata anonymorpha* Mittleman, type, U.S.N.M. no. 46988, male, Tehuantepec, Oaxaca, Mexico. G, *Uta bi-carinata bi-carinata* (Duméril), U.S.N.M. no. 20180, male, Cuernavaca, Morelos, Mexico. H, *Uta bi-carinata nelsoni* Schmidt, type, U.S.N.M. no. 46836, male, Cuicatlán, Oaxaca, Mexico.

Fig. 2.—Distribution of the *Uta ornata* complex in Mexico.

basal portion of the tail; several lateral series of enlarged, granular, spinose scales; ventrals abruptly differentiated from the scales of the lateral areas; scales of belly and gular region strongly imbricate and submucronate; frontal typically divided transversely; a postfemoral dermal pocket regularly present. Coloration (alcoholic male topotype): A series of six to nine dark spots on the dorsolateral line extending from axilla to groin; a vertebral series of smaller, alternating spots extending from the nape to the basal portion of the tail; dorsolateral and vertebral spots of both sides usually joined by undulating light brown bands, which are occasionally broken medially; general dorsal coloration of body and limbs light gray or brown, or occasionally a uniformly rufescent dark brown which completely obliterates any semblance of pattern; limbs barred above with dark brown; dorsum of tail similar to dorsum of body, and lightly ringed with pale brown; lateral areas a light blue-gray, irregularly streaked with brown; abdomen with two elongate, light blue patches which may or may not be fused medially; rostral and supralabials white, this color extending posteriorly in a narrow streak to the insertion of the fore limbs; infralabials flecked with gray; gular region anterior to the fold, light blue; underside of limbs, tail, interhumeral and interfemoral areas, whitish. Measurements of fifty adults, both sexes, insular and mainland: Snout to posterior border of ear, 12.6 mm; head width, 9.6 mm; snout to vent, 49.5 mm; hind leg (insertion to tip of 4th toe, exclusive of nail), 35.90 (these figures represent the weighted arithmetic means).

Distribution.—Tres Marias Islands; Tiburon Island; Sinaloa (Boulenger, *loc. cit.*); Sonora, south of the line Caborca–Magdalena.

Remarks.—Although my findings concerning the intergradation of *lateralis* and *linearis* (of southern Arizona) agree in substance with those of Van Denburgh (1922, p. 199), I have not been able to detect any signs of that intergradation in several hundred specimens from extreme southern Arizona as he did. I find, rather, that this intergradation occurs in the belt bordered on the north by the line Reforma–Cananea, and on the south by the line Caborca–Magdalena. Quite typical *lateralis* are taken regularly south of the Caborca–Magdalena line. Boulenger's record (*loc. cit.*) for the subspecies from Presidio de Mazatlan, Sinaloa, may be open to question on the grounds that Taylor and Smith, as well as other workers have failed to take any additional specimens of this form from that locality, while related species have been taken in the vicinity. Indeed, *lateralis* is known from no state except Sonora; extensive field studies should reveal this lizard in northern Sinaloa, at least.

Comparisons made between large series of insular and mainland specimens reveal only slight mensural differences, which are neither constant nor marked enough to warrant a subspecific distinction being made between the two populations.

U. o. lateralis may be quite easily separated from *linearis* on several scores. In the former, the enlarged dorsals commence well craniad of a line joining the anterior points of insertion of the fore limbs; in the latter race, these commence either slightly craniad of a line such as this, or else distinctly caudad of it. In *lateralis* the scales of the inner series of enlarged dorsals are

at least twice the size of the scales of the outer series; *lateralis* also possesses a prominent dorsolateral series of spots. *U. o. linearis* possesses no regular, distinct series of dorsolateral spots, nor is there a very appreciable difference in size between the scales of the outer and inner series of enlarged dorsals.

Uta auriculata Cope — Figs. 1C, 2

Uta auriculata Cope, Proc. Boston Soc. Nat. Hist., **14**: 303. 1871.

Type locality.—Socorro Island, Revillagigedo Archipelago.

Type.—U. S. N. M. no. 7027.

Diagnosis.—Unique among the members of the *ornata* complex in possessing the enlarged femoral scales uncarinated; two vertebral rows of small, enlarged scales, these weakly carinated, imbricate, and fairly regularly disposed; bordered on each side by a single series of enlarged, imbricate, weakly carinated, rather flat scales, which are about twice as large as those of the vertebral series; a few scattered, slightly enlarged scales on the dorsolateral line; frontal transversely divided; postfemoral dermal pocket probably present (type in too poor a condition to accurately determine this); general appearance not all rugose. Cope (*loc. cit.*) describes *auriculata* as having a row of spots on the dorsolateral line, on a blue ground color. Measurements of type: Snout to posterior border of ear, 17.0 mm; head width, 11.5 mm; snout to anus, 75.0 mm; hind leg (insertion to tip of 4th toe, exclusive of nail, 49 mm.

Distribution.—Restricted to the type locality.

Remarks.—Of this species, I have examined only the type specimen. As far as this specimen goes, it is quite distinct from other known members of the genus.

Uta clarionensis Townsend — Figs. 1B, 2

Uta clarionensis Townsend, Proc. U. S. Nat. Mus. **13**: 143. 1890.

Type locality.—Clarion Island, Revillagigedo Archipelago.

Type.—U. S. N. M. no. 15904.

Diagnosis.—Enlarged vertebral scales distinctly carinated, in two irregular series commencing on the nape of the neck and extending posteriorly onto the base of the tail for a short distance; bordered on either side by two series of enlarged, strongly carinated, imbricate scales, which are larger than the vertebrals, and of which the scales of the outer series are smaller than those of the inner series; scales on thighs enlarged and prominently carinated; dorsolateral tubercles and spinose scales well developed, and in clusters, forming an almost unbroken ridge; frontal transversely divided; postfemoral dermal pocket absent. Measurements of type: Snout to anus, 53 mm; hind leg (insertion to tip of 4th toe, exclusive of nail), 41.0 mm; snout to posterior border of ear, 14.0 mm; head width, 10.0 mm.

Distribution.—Restricted to the type locality.

Remarks.—Because of its closer affinity to *lateralis* than to the neighboring *auriculata*, *clarionensis* presents several important and interesting phylogenetic features. These will be later discussed under the phylogeny of the several forms.

Uta bi-carinata bi-carinata (Duméril) Figs. 1F, 2

Phymatolepis bi-carinatus Duméril, Arch. Mus. Hist. Nat. Paris 8: 549, pl. 23, figs. 2, 2a, 2b. 1856.

Type locality.—"Mexico."

Type.—Not designated; if in existence, probably in the Muséum d'Histoire Naturelle de Paris.

Diagnosis.—Two or three vertebral series of enlarged, imbricate, weakly to prominently carinated scales, extending in a continuous or a broken line from the nape of the neck or the shoulders to the basal portion of tail, on which it continues for a distance subequal to the length of the femur; external to the vertebral series and bordering them on each side, is a single series of greatly enlarged, strongly carinated, imbricate scales which are occasionally unequal in size, irregular of arrangement, and frequently interrupted; the largest of the dorsal scales smaller than the largest of the femoral and tibial scales, which are imbricate and strongly carinated; external to the enlarged dorsals, which border the vertebrals, there is on each side a series of enlarged scales almost equaling them in size and rugosity; these sometimes in contact with the enlarged dorsals, but more often separated by two to four of the granular, convex scales of the back; these enlarged scales are also irregular in size and disposition, often commencing anterior to the enlarged dorsals; two or three enlongated series of enlarged tubercles on the neck; a prominent series of enlarged, spinose scales on the dorsolateral line, and ventral to these are four more, somewhat less prominent series, the lowest of which is in contact with the ventrals; ventrals mucronate, and occasionally somewhat spinose; as they progress laterally there is a slight tendency towards carination, which becomes most noticeable in the lateral scales; scales of the chin granular and pavemented medially and laterally; elongated, flattened, spinose and imbricate posteriorly; frontal variable, but most often entire; a postfemoral dermal pocket usually absent, but sometimes rudimentarily present. Coloration (alcoholic male): Grayish ground color on dorsum of body, head, limbs and tail; body dorsum with four or five dark cross bands, which may or may not be visible, due to an occasional suffusion of dark pigment throughout the skin, these bands often being broken medially; entire forsum of body and limbs often flecked with dark gray, pale gray, or brown; lateral areas of body usually similar in color to dorsum, but more often tinted with a bluish wash; venter of limbs, interhumeral and interfemoral areas, of varying shades of gray, and often heavily mottled with brown; ventrally, the basal portion of the tail a light gray, occasionally spotted with dark brown; a broad blue patch on the belly, which is slightly more intense anteriorly, and which may or may not be overlaid with a heavy stippling of gray or brown; except for an occasionally light medial area, the entire chin, including the infralabials, is heavily mottled with black or brown. Smith (1935, p. 170), reporting on freshly collected specimens says "the entire gular region is orange, coarsely reticulated or diagonally barred with black except in a large, round median area just anterior to the gular fold." Measurements of fifty adults, both sexes: Snout to posterior edge of the ear, 12.5 mm; head width, 10.6 mm; snout to anus, 52.5 mm; hind leg (insertion to tip of 4th toe, exclusive of nail), 29.6 mm (these figures represent the weighted arithmetic means).

Distribution.—Michoacán, Morelos, Puebla, and Guerrero west of Acapulco.

Remarks.—Much of the confusion surrounding the status of this form is

undoubtedly due to the fact that Duméril designated simply "Mexico" as the type locality for his species, and this only through inference. Consequently, the several authors who have had occasion to deal with *bi-carinata* and its affiliates, especially prior to the separation by Schmidt (1921) of the then composite species, have cluttered the literature with erroneous locality records based on misidentified specimens. Both Schmidt (*op. cit.*) and Smith (1935) have contributed to the clarification of the status of *bi-carinata*, and to these authors credit is largely due for bringing a measure of order to the state of chaos.

The Utas from the southern periphery of the range of *bi-carinata*, notably from a point just southeast of Acapulco and extending through Guerrero to Tierra Colorada, exhibit certain tendencies which are not in accord with the attributes to be noted in more northerly examples. As the population continues in the direction of the Oaxacan border this trend becomes more noticeable, so that in eastern Guerrero and Oaxaca, the lizards can no longer be considered identical with their more northerly relatives, and clearly possess the status of a separate biological entity. Since the population from Michoacan, Puebla, Morelos, and western Guerrero more closely fits the original description than does the southern form, I have retained the name *bi-carinata* for it, and described the southern population as a distinct subspecies.

Uta bi-carinata anonymorpha Mittleman Figs. 1G, 2

Uta anonymorpha Mittleman, Herpetologica II, **2**: 34, pl. 3, fig. 2. 1940.

Type locality.—Tehuantepec, Oaxaca.

Type.—U. S. N. M. no. 46988.

Diagnosis.—Enlarged vertebral series of scales and the scales external to them, which are larger in size, commencing on the shoulders only slightly craniad of a line joining the anterior points of insertion of the fore limbs; enlarged dorsals in a continuous series or but barely encroached upon by a few of the small, granular scales of the back; enlarged dorsals regularly arranged and not too strongly carinated; external to the enlarged dorsals is a sparse series of enlarged scales, a trifle larger in size than the scales of the vertebral series, but never approaching size the larger enlarged dorsals; this outermost series of enlarged scales never in contact with the primary series of enlarged scales, but in contact at several points with the rather sparse and poorly developed tubercular and submucronate scales of the dorsolateral line through the medium of small, elongated clusters of slightly enlarged, granular scales; thoracic tubercles not well developed and not too prominent; dorsolateral and lateral tubercles often not well developed, and often not in clusters, but consisting rather of a single enlarged, spinose, tubercular scale surrounded by two or three somewhat enlarged, mucronate scales; ventrals mucronate and spinose, especially posteriorly; laterally these become distinctly carinated and quite prominently pavemented; scales of the chin small, rather flat, and generally pavemented, only those scales immediately anterior to the gular fold becoming elongated, imbricate, and somewhat spinose; general appearance not very rugose. Coloration (alcoholic male holotype): Quite similar to that of *bi-carinata*, save that the ventral blue (or blue-black) patches are very abbreviated, and restricted to the pectoral area;

chin usually not as heavily maculated as in *bi-carinata;* occasional specimens are uniformly suffused with a deep blue-gray which completely obliterates any dorsal traces of pattern. Measurements of holotype: Snout to posterior border of ear, 11.5 mm; head width, 9.0 mm; snout to anus, 50.0 mm; hind leg (insertion to tip of 4th toe, exclusive of nail), 27.0 mm.

Distribution.—Guerrero, east of Tierra Colorada; Oaxaca, except the northeastern corner; eastern Chiapas (Tonolá).

Remarks.—I have previously postulated (*loc. cit.*) on the possibility of a subspecific relationship existing between *bi-carinata* and *anonymorpha.* Through the kindness of Dr. Hobart M. Smith I have been able to examine a large series of Utas from Morelos, Guerrero, Michoacán, and Oaxaca and Chiapas, which he has just recently returned with, after a protracted collecting trip in southern Mexico. A critical study of these specimens leaves no doubt that *bi-carinata* does in fact extensively intergrade with *anonymorpha* throughout the entire region from Acapulco east to Tierra Colorada, Guerrero. Specimens from the last named locality range from typical *anonymorpha* to typical *bi-carinata,* with every conceivable degree of arrangement of the hybrid characters. However, since the largest part of the specimens from Tierra Colorada are undeniably *anonymorpha,* I consider this point to be the westernmost range of this subspecies' distribution. The extension of the range of *anonymorpha* to include eastern Chiapas, is on the basis of two specimens collected by Dr. Smith at Tonolá; a very large male and an immature female, both, however, somewhat atypical. There is a strong possibility that specimens from more easterly Chiapas will prove to be distinct from *anonymorpha,* and these two examples may indicate some such tendency.

Generally speaking, *anonymorpha* is quite easily separated from *bi-carinata.* In males, the abbreviated blue abdominal patches are quite distinctive in *anonymorpha;* while the ventral coloration tends to take on the appearance of an evenly diffused wash in *bi-carinata* males. In specimens of either sex, *anonymorpha* can be told at once by its much less rugose appearance, and the definitely weaker carination of the enlarged dorsals. More often too, *anonymorpha* will possess an evenly mottled chin, whereas *bi-carinata* has a tendency to possess a light median area; this has already been noted by Smith (1935, p. 170). The holotype and paratypes on which the race is based agree very well with the series of 98 specimens taken by Smith.

Uta bi-carinata nelsoni Schmidt Figs. 1H, 2

Uta nelsoni Schmidt, Amer. Mus. Nov., No. 22: 4. 1921.

Type locality.—Cuicatlam (=Cuicatlán), Oaxaca.

Type.—U. S. N. M. no. 46836.

Diagnosis.—Most closely allied to *bi-carinata* and *anonymorpha,* from which races it differs only as follows: Ventrals not mucronate; dorsolateral and lateral series of tubercular scales poorly developed; head narrower proportionately than in *bi-carinata,* and broader proportionately than in *anonymorpha;* enlarged dorsals smaller. Measurements of type: Snout to posterior

border of ear, 13.5 mm; head width, 10.5 mm; hind led (insertion to tip of 4th toe, exclusive of nail), 33.0 mm; snout to anus, 58.0 mm.

Distribution.—Restricted to the type locality.

Remarks.—*U. b. nelsoni* is designated as a subspecies of *bi-carinata* for the following reasons: The marked similarity in structure to the typical form and *anonymorpha;* the continuity and contiguity of its distribution with the *bi-carinata–anonymorpha* stock, the ranges of all three being juxtaposed; and the possibility that *nelsoni* represents an intermediate population in position between the *bi-carinata–anonymorpha* stock, and some form, as yet undescribed, from extreme northwestern Oaxaca and possibly southern Veracruz. The range of mountains just north of the city of Oaxaca have undoubtedly served to keep *nelsoni* isolated from *anonymorpha;* specimens from the immediate vicinity of this city will do much to clarify the relationships between *nelsoni* and the more southerly Oaxacan race.

Of this subspecies I have examined only the type specimen. This lone individual is distinct enough from *anonymorpha* and *bi-carinata,* but only on the basis of the characteristics given above. Other points of distinction given by Schmidt (*loc. cit.*) do not seem tenable.

Uta bi-carinata tuberculata Schmidt Figs. 1E, 2

Uta tuberculata Schmidt, Amer. Mus. Nov., No. 22: 4. 1921.

Type locality.—Colima, State of Colima.

Type.—A.M.N.H. no. 13737.

Diagnosis.—Most closely related to *bi-carinata,* from which it differs as follows: Enlarged dorsals larger, more regularly arranged; equal to, or larger than, the enlarged femoral and tibial scales; external to the enlarged dorsals but in contact with them, or separated by only one or two granules, there is a series of slightly enlarged scales, which are visibly keeled, but neither as large nor as prominent as the primary series of enlarged dorsals; dorsolateral and lateral tubercles and enlarged spinose scales very regularly arranged, but not as prominent as in *bi-carinata;* lowest series of lateral tubercles in contact with the ventrals, which are not sharply differentiated from the granular scales of the sides; ventrals rounded, occasionally submucronate; slightly keeled laterally; gular scales for the most part elongated and imbricate, save for a few immediately adjacent to the infralabials, which are granular and pavemented; frontal variable, usually divided transversely; postfemoral dermal pocket variable; coloration similar to *bi-carinata.* Measurements of type: Snout to posterior border of ear, 12.0 mm; head width, 9.0 mm; snout to anus, 45.0 mm; hind leg (insertion to tip of 4th toe, exclusive of nail), 27.0 mm.

Distribution.—Colima and Jalisco (Schmidt, *loc. cit.*); Presidio de Mazatlán, Sinaloa (Smith, 1935, p. 171); southern Sonora (20 miles southeast of Alamos).

Remarks.—Other than some slight variation in color and pattern, the specimens I have seen agree rather well with the type, differing only in a few minor points.

Because of a dearth of Utas from southern Sonora to central Jalisco, the

distribution of *tuberculata* is imperfectly known. First known from Jalisco and Colima, the type series remained unique until Smith (*loc. cit.*) reported on a specimen taken by him just south of Presidio de Mazatlán, Sinaloa, which extended the range northward for about two hundred miles. In the course of an examination of Mexican Utas in the collection of the Museum of Comparative Zoology I came upon two specimens, M.C.Z. nos. 37856–7, collected near Guirocabo, 20 miles southeast of Alamos, Sonora. These two specimens are quite typical of the subspecies, and on the basis of their locality, the range of *tuberculata* is extended northward again for another two hundred and eighty miles. Dr. Smith tells me in a letter that this closely corresponds to the distributional pattern of *Sceloporus nelsoni*.

U. b. tuberculata is obviously a member of the neotropical *bi-carinata* stock; just what its relationships with the nearctic *lateralis* might be must await the discovery of further specimens from Sinaloa, southern Sonora, and northern Jalisco.

Uta unica, sp. nov. Figs. 1D, 2, 3

Uta bicarinata Cope, Rept. U. S. Nat. Mus. for 1898: 320–322, fig. 43. 1900.

Holotype.—U. S. N. M. no. 14248, female, "Chihuahua," collected by Edward Wilkinson.

Diagnosis.—A medium-sized *Uta* belonging to the Mexican division of the *Uta ornata* complex, and characterized by only a single series of enlarged dorsal scales on each side of the enlarged vertebrals; general appearance not at all rugose; dorsal and ventral scales with a distinct tendency toward pavementation.

Description.—Cephalic scales comparatively smooth; frontal entire, separated behind from the interparietal by a pair of frontoparietals; rostral much wider than high; supralabials 5–5, the fourth and fifth subocular in position; infralabials 7–7; auricular opening anteriorly denticulated by several enlarged, granular scales; a few scattered enlarged scales on the nape and shoulders, extending caudad from a point just posterior of a line joining the insertions of the fore limbs, along the vertebral line onto the base of the tail for a distance subequal to the length of the femur, is a series of enlarged scales, bordered on each side by a single series of much larger scales, which are, however, inferior in size to the enlarged scales of the femur, but larger than the enlarged tibial scales; enlarged dorsal scales only weakly carinated, and prominently pavemented; external to the enlarged scales and in contact with them, or more often separated by the width of the vertebral series, is another series of enlarged scales, spaced about two scale lengths apart; these latter equal to or slightly smaller than the enlarged scales bordering the vertebral series; the outer enlarged scales often surrounded by minutely enlarged tubercular scales; on the dorsolateral, lateral, and ventrolateral areas are evenly dispersed four longitudinal series of small clusters of slightly enlarged, somewhat convex scales, which are not at all rugose; the lowermost of these rows of clusters barely in contact with the ventrals; ventral scales imbricate and mucronate anteriorly, but medially, laterally, and posteriorly, they become rounded and quite pavemented, again becoming spinose and imbricate as they approach the anal region; ventrals abruptly diminishing in size to meet the lateral scales; gular scales pavemented and rounded anteriorly, but mucronate and imbricate posteriorly, and no-

ticeably increasing in this tendency, until in the region of the gular fold the scales are longer than wide and distinctly spinose; gular fold extending laterally and dorsally around the anterior edge of the insertions of the fore limbs, and met by a heavy postauricular fold; caudal scales large, prominently keeled, spinose, and at least basally, in irregular whorls of three verticils, of which the first is always prominently larger; postfemoral dermal pocket absent. Coloration of holotype (alcoholic): Dorsum of head and body greenish gray, the head finely reticulated with light brown, and the body with two light brown bands which are narrow on the vertebral line and widen as

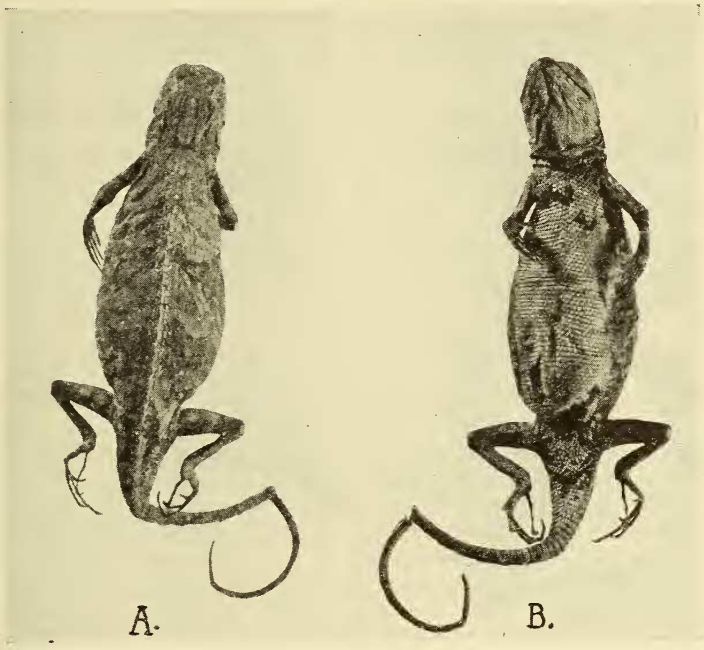


Fig. 3.—*Uta unica*, sp. nov.; type, U.S.N.M., no. 14248, female, Chihuahua, Mexico. Edward Wilkinson, collector. Actual length, snout to vent, 50.0 mm. (A) Dorsal view; (B) ventral view.

they progress laterally; dorsum of the body irregularly flecked and barred with dark brown; axillary, inguinal, lateral, prehumeral, postfemoral, and postanal regions washed with dark brown; an irregular, dark brown pectoral blotch; gular area and the remainder of the venter of body and tail a very pale greenish gray; limbs narrowly barred with light brown. Cope (*loc. cit.*) describes the specimen which was then fresh, as having "limbs and tail shaded with reddish brown," and says further that the "inferior regions tinted yellow lightly stippled with brown; males have the entire abdominal region a bluish gray." Measurements of holotype: Snout to posterior border of ear, 11.5 mm; head width, 9.0 mm; snout to vent, 50.0 mm; hind leg (insertion to tip of 4th toe, exclusive of nail), 26.5 mm; tail 52.0 mm.

Distribution.—At present known only from the southwestern (probably) corner of the state of Chihuahua.

Remarks.—This unique species is quite different from any other known *Uta*, and insofar as it can be determined, represents a dwarf offshoot of a probable pre-*tuberculata* stock. Although immediately recognized as being distinct, formal recognition of it was deferred until such a time as might bring to light further specimens. Since a careful examination of several extensive collections of Mexican Utas has failed to reveal any additional specimens, I have, at the suggestion of Dr. H. M. Smith, described the species in the hope that future collectors working in southern Chihuahua may have the good fortune of taking more specimens. A study of the distributional patterns of the only other two Utas of the complex occurring in Chihuahua (*U. o. schmidti* and *U. caerulea*) leaves no doubt that the only suitable unoccupied ecological niche for this species would occur in the mountainous southwestern portion of the state, and it is from here that the type probably emanated. I can only attribute the lack of additional specimens to the fact that since Wilkinson collectors have largely neglected this part of Chihuahua.

The distinctness of *unica* from other known Utas bespeaks quite a respectable age, as well as long separation from other members of the complex.

Uta caerulea Smith

Uta caerulea Smith, Univ. Kansas Sci. Bull. 12(7): 172–178, pl. 26 (3). 1935.

Type locality.—Thirty miles north of Chihuahua City, Chihuahua.

Type.—David H. Dunkle–Hobart M. Smith Coll. no. 132.

Diagnosis.—Two vertebral rows of enlarged, irregularly arranged, weakly carinated scales, extending from a point slightly craniad of a line joining the anterior points of insertion of the fore limbs, posteriorly onto the base of the tail for a distance equal to the length of the femur; vertebrals bordered on either side by two series of enlarged, imbricate, rather weakly carinated scales, the outer series slightly smaller; largest of the dorsal scales inferior in size to the largest of the tibials; dorsolateral tubercles but slightly enlarged, and dispersed in irregular little clusters; ventrals rounded, smooth, and imbricate; frontal transversely divided; a postfemoral dermal pocket present. Coloration of male (from original diagnosis, *loc. cit.*): Entire ventral surfaces of body and tail, except chest, base of tail, and an area between the hind legs, sky blue; dorsum with about seven transverse black bars on each side; bars usually blue-edged. Measurements of type (Smith, *loc. cit.*): Snout to anterior border of ear, 10.0 mm; head width, 10.0 mm; snout to vent, 49.5 mm; hind leg, 30.0 mm.

Distribution.—Within a radius of 30 miles of Chihuahua City, Chihuahua.

Remarks.—I include *caerulea* as a full species rather than as a subspecies with some reservations, as I have seen several specimens intermediate in character between *caerulea* and the newly described (Mittleman, 1940) *U. o. schmidti* from Texas and northern Chihuahua; these, however, bore only the data "Border," or "Mexico." I prefer to consider *caerulea* as a full species until the precise distribution of both forms in Chihuahua is completely mapped out.

Uta caerulea is the only species within the *ornata* complex wholly indige-

nous to Mexico, that is a member of the subgroup within the complex which features two nearly equal series of enlarged dorsals on either side of the enlarged vertebrals; this condition regularly obtaining in the species indigenous to the United States. The characteristics of *caerulea* are such that they appear to be but newly differentiated from the *U. o. ornata* and *U. o. schmidti* stock, a population which is in itself quite recent and still undergoing a proliferation as well as loss of numerous traits. Smith (*loc. cit.*) has distinguished between *caerulea* and *ornata* (=*schmidti*), and enumerated several salient points of difference. In the main, the following distinctions will serve to separate the two forms: in *caerulea*, the enlarged dorsals extending onto the base of the tail for a distance equal to the length of the femur; never more than half this distance in *schmidti;* largest of the enlarged dorsals inferior in size to the enlarged tibials, in *caerulea;* in *schmidti*, these scales are equal to, or larger than, the enlarged tibials; *caerulea* with the blue of the gular region extending to include the sublabials; in *schmidti*, the sublabials are white or gray, but always distinct from the gular region in coloration. Smith also remarks that *caerulea* may be told from *lateralis* by the commencement of the enlarged dorsals on the nape of the neck in the latter; also, the inner series of enlarged dorsals much larger in size than the outer series.

PHYLOGENY OF THE COMPLEX

The *Uta ornata* complex is defined as that group of lizards within the genus *Uta* which is characterized by the possession of one or more series of enlarged dorsal scales bordering a similar though smaller series of vertebral scales; the group is so-named because *Uta ornata ornata* was the first described form within it. In the United States, Mexico, Baja California, the islands within the Gulf of California, and at least two of the islands composing the Revillagigedo Archipelago, there occur 15 species and subspecies of Utas, which, by reason of the common bond previously defined, are assigned to this complex.

Smith (1935, p. 177) has postulated that the genera *Uta* and *Sceloporus* have shared a common ancestor, *Uta* being possibly a trifle older than *Sceloporus*. Smith states further that the *ornata* group may be considered the most primitive in the genus *Uta*, and the *mearnsi* group the most highly developed. I find Smith's hypothesis substantiated, and ascribe to it too. *Uta* may be fairly well separated into four groups, these, in the order of their complexity and evolution from oldest to newest, being *ornata–graciosa–stansburiana–mearnsi*. The trend, apparently, in *Uta* is from a rugose, carinated, enlarged scaled form to a minutely scaled, smooth form.

Within the *ornata* complex, *wrighti* (=*levis* of Smith, *et auct.*) is probably the most primitive species. The primitive *Uta ornata* fore-

bear can be described as a *Uta* bearing weakly carinated, irregularly arranged, numerous series of enlarged dorsals; poorly developed series of enlarged dorsolateral and lateral tubercles; ventrals rounded; of existing Utas, *wrighti* most closely approaches this hypothetical form. Without delving into the ramifications of the proliferation of species within the United States, let it suffice to say that *wrighti* gave rise directly to the more rugose, larger scaled *linearis* of southern Arizona and northern Mexico. At about the time of the early Oligocene, *linearis* spread southward into what is now northern Sonora, which existed in a continuous range of land with the present-day Gulf of California, Baja California, and western Mexico as far west as the Revillagigedo Archipelago. This era saw the submersion of the west coast of Mexico from southern Jalisco to and including the Yucatan Peninsula.

The vanguard of the *linearis* emigration must have been characterized by an extreme genetic instability, for the foremost of these lizards soon formed the *lateralis*, or actually pre-*lateralis*, stock. The stock must have been of an active, aggressive, and successful nature; it spread in all possible directions, and soon became established in numerous ecological situations. That these lizards possessed an extremely active genetic constitution, and bore several strains, is attested to by the fact that the recession of the southern waters which formed the Gulf of California, the several islands within the gulf, the Revillagigedo Archipelago, and left southern Mexico dry, left several populations comparatively isolated, and these soon differentiated into distinct forms. The pre-*lateralis* population promptly continued its southward trek, while the remaining members evolved into the modern *lateralis*. The two small groups of lizards that were isolated on Socorro and Clarion Islands, respectively, of the Revillagigedo Archipelago, offer remarkable proof of the diversity of this pre-*lateralis* stock; for *auriculata* of the former island bears a closer resemblance to *bi-carinata* and its affiliates than it does to either *lateralis* or the neighboring *clarionensis* of Clarion Island. Conversely, *clarionenis* is more nearly related to *lateralis* than to *auriculata* or any other existing form.

The emersion of southern Mexico probably took place during the early Miocene, and the expansion of the pre-*lateralis* stock followed the recession of the waters, hampered only by the high Sierra Madre on the east, and the Pacific Ocean on the west. This southerly migration was accompanied by the adoption of variously isolated niches as well as changing genetics which similarly contributed to the differen-

tiation of several new forms. Ultimately, this resulted in the evolution of the line *lateralis–tuberculata–bicarinata–nelsoni–anonymorpha*, the latter two races probably developing simultaneously, with their distinction being due to the isolation afforded the *nelsoni* stock by the high mountains just north of Oaxaca (city). Additional specimens from more easterly localities in Chiapas may reveal that a still undescribed race exists there, for this region was separated from the Tehuantepecan area by a post-Miocene immersion, and did not become continuous with it again until the Pliocene, thus affording ample time for the differentiation of another race. This has been found to be the case with certain *Cnemidophori* (Burt, 1931, p. 73). *Caerulea* is quite probably but a newly differentiated species, sprung from the *ornata-schmidti* stock, from which it differs only in degree.

In the study of the evolution and phylogenesis of the Mexican *Uta ornata* lizards, certain characteristics lend themselves very well as salient indicator factors to the examination of such trends. These are: (1) the number and size of the enlarged dorsals; (2) the form of the ventral scales; and (3) the absence or presence of a postfemoral dermal pocket. The last-named feature occurs in all the forms indigenous to the United States, is present too in *U. caerulea*, also in *lateralis*, is variable in *tuberculata* and *bi-carinata* (although most often absent in this latter race); is always absent in *unica*, *anonymorpha*, and *nelsoni*, is possibly rudimentary in *auriculata*, and absent in *clarionensis*. The trend from *lateralis* to *anonymorpha* is from a smooth, rounded ventral scale, to a carinated, spinose one. Again *auriculata* and *clarionensis* reveal their closer affinity to certain mainland forms than with each other, for *auriculata* possesses ventrals almost indistinguishable from those of *bi-carinata*, while those of *clarionensis* bear a remarkable resemblance to the condition obtaining in *lateralis*. The southward progression of the races reveals too that there is a steady decrease in the size and number of the enlarged dorsals, from *lateralis* to *anonymorpha*; *clarionensis* again resembling *lateralis*, and *auriculata* the southerly races. In all of its traits, *unica*, as its name implies, is quite unique. On the whole, however, it seems to be a specialized offshoot of the pre-*tuberculata* stock.

From the preceding discussion it will be readily seen that the members of the Mexican division at least, of the *Uta ornata* complex, define themselves into a clearcut example of a formenkreis. Although the races indigenous to the United States have not been included here, it may be added that they just as readily incorporate into a similar pattern. Ample opportunity for differentiation through isolation and

extreme genetic activity has resulted in the several diverse forms. It is this hyperactive state of genetics that has produced the innumerable mutants which gave rise to the different species and subspecies; whether the mutants produced will survive and because of a possibly changed physiology seek an unoccupied ecological niche in which they may successfully multiply, or whether they will remain within the genetic scope of the parental stock, and add to the sum-total of what taxonomists are pleased to call the normal variation of the species, is the needle's eye through which the latent species-in-the-making must pass. In the case of the Utas under consideration, at least, the passage seems to have been successfully navigated several times. The evolution of the Mexican lizards of the *ornata* complex can perhaps be best described as a case of dynamic orthogenesis accompanied by constantly changing physiologies, and the success or failure of the ecological niche occupied. This, then, follows the pattern of multiplication of species through the isolation and mutation of older species, as postulated by Dunn (1934). However, there is no implication that of necessity any of the ancestral features need survive. Kinsey (1936, p. 54) has pointed out that within a complex or formenkreis "each species gives rise to one or to a limited number of new types without modifying the specific status or the existence of the older species." Hence, although an older parental species may be well established, and the newer derivative species equally well established, there is no implication necessary on the basis of the successful existence of the newer species, that any traits of the older form must necessarily be present, or have some survival value. The very existence of the newer population, regardless of any characteristics common to both stocks, is ample proof of its success. Neither is there any need for the assumption that within a single cohesive group, as a complex or formenkreis, there must be a continuity of traits. These traits may well appear in several members of the complex, but they may equally well be absent. A genetic change which is sweeping enough to cause the physiology of a lizard to become so altered that it cannot tolerate the parental habitat, may in itself cause, or may be accompanied by a change that will cause an equally sweeping change of form.

In their distribution and evolution, the Mexican *Uta ornata* complex representatives bear a close resemblence to the patterns worked out for *Ctenosaura*, by Bailey (1928); there is an even more marked similarity in their distribution and specific proliferation with those worked out for the Mexican wasps of the genus *Cynips* by Kinsey (1936).

LITERATURE CITED

Bailey, John Wendell. *A revision of the lizards of the genus* Ctenosaura. Proc. U. S. Nat. Mus. **73**(12): 1–55, pls. 1–30. 1928.

Boulenger, George Albert. *Descriptions of new species of lizards and frogs collected by Herr A. Forrer in Mexico.* Ann. Mag. Nat. Hist. (ser. 5) **11**: 342–344. 1883.

Burt, Charles E. *A study of the teiid lizards of the genus* Cnemidophorus, *with special reference to their phylogenetic relationships.* U. S. Nat. Mus. Bull. **154**: 1–286, figs. 1–38. 1931.

Cope, Edward Drinker. *Description of the common lizard of Socorro.* Proc. Boston Soc. Nat. Hist. **14**: 303. 1871.

———. *The crocodilians, lizards and snakes of North America.* Rept. U. S. Nat. Mus. for 1898: 153–1270, pls. 1–36, figs. 1–347. 1900.

Duméril, A. *Phymatolépide deux carenes,* Phymat. bi-carinatus *A. Dum., espece nouvelle.* Arch. Mus. Hist. Nat. Paris **8**: 549, pl. 23, figs. 2, 2a, and 2b. 1856.

Dunn, Emmett Reid. *Systematic procedure in herpetology.* Copeia **4**: 167–172. 1934.

Kinsey, Alfred C. *The origin of higher categories in* Cynips. Indiana Univ. Publ., sci. ser., **4**: 4–334, figs. 1–172. 1936.

Mittleman, Myron B. *Two new lizards of the genus* Uta. Herpetologica II, **2**: 33–38, pl. 3, figs. 1, 2. 1940.

Schmidt, Karl Patterson. *New species of North American lizards of the genera* Holbrookia *and* Uta. Amer. Mus. Nov., no. 22: 1–6. 1921.

Smith, Hobart M. *Descriptions of new species of lizards from Mexico of the genus* Uta, *with notes on other Mexican species.* Univ. Kansas Sci. Bull., **12**(7): 157–183, pl. 26. 1935.

Townsend, Charles H. *Reptiles from Clarion and Socorro Islands and the Gulf of California, with description of a new species.* Proc. U. S. Nat. Mus. **13**: 143. 1890.

Van Denburgh, John. *The reptiles of western North America,* vol. 1. Occ. Pap. California Acad. Sci. **10**: 1–612, pls. 1–57. 1922.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

THE ACADEMY

364th MEETING OF THE BOARD OF MANAGERS

The 364th meeting of the Board of Managers was held in the Private Dining Room of the Cosmos Club on Friday, December 6, 1940. President Crittenden called the meeting to order at 8:00 p.m., with 17 persons present.

President Crittenden appointed G. W. Vinal, chairman, W. G. Brombacher, and J. W. McBurney to constitute the Committee of Tellers to canvass the ballots in the annual election of officers for 1941.

President Crittenden appointed H. E. McComb, chairman, F. S. Brackett, and L. V. Berkner to constitute the Committee of Auditors to examine the accounts of the Treasurer for the calendar year 1940.

C. L. Garner, chairman of the Committee on Meetings, reported that all the meetings of the Academy through April, 1941, would be held in the present Assembly Hall of the Cosmos Club.

G. Steiner, chairman of the Committee on Membership, presented the names of 11 persons for membership in the Academy—9 resident and 2 nonresident.

The Corresponding Secretary presented for R. E. Gibson, chairman of the Nominating Committee, the report of that committee on their nominations for officers for 1941: